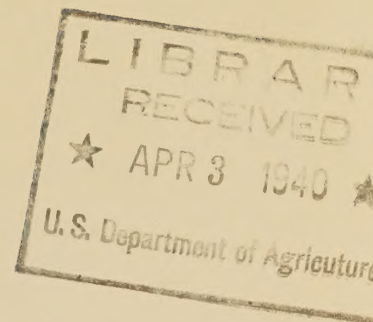


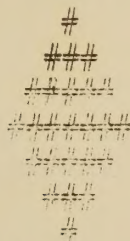
1.932
A2 R24

not ALN



RECORD OF INFORMAL CONFERENCE

Basic Research Committee
of the
National Cottonseed Products Association
and
Administrative and Scientific Staff Members
of the
Bureau of Agricultural Chemistry and Engineering



January 31, 1940

Conference Room 4005 South Building
U. S. DEPARTMENT OF AGRICULTURE

This record is based on notes taken during an informal conference on research on cottonseed products conducted under the direction of the Bureau of Agricultural Chemistry and Engineering.

In attendance during a part or all of the meeting were the following:

H. G. Knight, Chief, Bureau of Agricultural Chemistry and Engineering
W. W. Skinner, Associate Chief, Bureau of Agricultural Chemistry and Engineering
W. B. VanArsdel, Acting in Charge, Regional Laboratories
D. F. J. Lynch, Director, Southern Regional Laboratory
K. S. Markley, Chief, Oil, Fat & Protein Division, Southern Regional Laboratory
R. S. Hollingshead, Acting in Charge, Food Research Division
R. W. Riemenschneider, Chemist, Food Research Division
C. E. Swift, Cottonseed Research Fellow
E. L. Skau, Senior Chemist, Acting in Charge, Analytical and Physical Chemical Division, Southern Regional Laboratory
Henry Stevens, In Charge, Allergen Investigations

E. R. Barrow, Chairman, Basic Research Committee, National Cottonseed Products Association, Barrow-Agee Laboratories, Memphis, Tennessee
R. H. Fash, Forth Worth Laboratories, Fort Worth, Texas
T. C. Law, Law & Company Laboratories, Atlanta, Georgia
H. S. Mitchell, Swift & Company, Chicago, Illinois
A. S. Richardson, Procter & Gamble Company, Cincinnati, Ohio
Andrew Schwartz, South Texas Cotton Oil Company, Houston, Texas
T. H. Gregory, Executive Vice-President, National Cottonseed Products Association

M. H.
APR 23 1940

Dr. Knight opened the meeting at 9:30 A. M. and in welcoming members of the Basic Research Committee acknowledged the mutual advantages to the Department of Agriculture and to the cottonseed producers and processors to be had in discussion of their problems. Dr. Knight emphasized the need for continued counsel from competent leaders among the agricultural processing industries in formulating and guiding the work of the Regional Laboratories.

Dr. Skinner, acting as chairman of the conference called on Mr. Barrow.

Mr. E. R. Barrow: I want to thank you for the privilege that we have had for some years of meeting with you at least once a year for discussion of our mutual problems. I appreciate the fine cooperation we have always had from your Bureau and the cordial relations which have always existed. We come together at this time with a feeling of humility and apology on our part for the reason that this Committee received a great shock last year in having the cooperation of the Association and its support of research cut off but later restored in part.

The committee has asked me to interpret that action as indicating no lack of appreciation for the cooperative relations that have existed between our industry and this Bureau, but rather to interpret it as a trait of human nature. Many members of our industry appreciate the value of research and where there is this understanding there is a very deep appreciation of the fine accomplishment of the Fellowship work. We have frequently mentioned the fact that fundamental research of the type carried on under our cooperative agreement is very difficult to dramatize. And to attempt to publicize every step in the progressive development of a research problem is not always feasible. We have suffered to some extent by that fact. Without doubt there has been confusion in some quarters in the interpretation of the functions of the new Regional Laboratories. That confusion has influenced opinion about the role of our Research Fellowship. We were all somewhat stunned by the enormity of funds made available to the Regional Laboratories for research, especially in comparison with the small sum that we have been contributing.

The Committee met yesterday and had a very interesting discussion as to its future. Our committee on research has been in existence since 1921. It has had a very happy relationship with this Bureau. We feel now with the larger program in view that possibly this committee is misnamed and that it should be designated as a technical advisory committee of the Industry. It may be the same committee as we see today but this Basic Research Committee has asked that it be discharged and that a new committee be appointed in its place to be known as a Technical Advisory Committee--an advisory committee that will direct the technical functions of the Association and also will be available in an advisory capacity. We shall recommend the continuance of the present Fellowship work--at least until its status is determined by future developments. I feel confident in making this statement that what happened this

past summer will not happen again. Members of this Committee realize that they should perhaps devote more effort to acquainting the Association membership with the value and importance of the research work that has been done and that should be done.

We would like very much to go over with you some points that may be a repetition of our discussion last year. If you are now able to elaborate on some of the plans and policies of the Bureau with respect to the new Regional Laboratories, we shall be much interested in them. We have no definite program of our own for this meeting except to consider the work that is being done by Mr. Riemenschneider and Mr. Swift. We would like to have you outline matters of interest to the members of our industry in connection with the work of the Bureau and the Regional Laboratories. I don't know if any members of the Committee have anything to add to what I have just said, but I would be glad to hear from them.

Dr. A. S. Richardson: We hope that this Technical Advisory Committee, or whatever it may be named, in the National Cottonseed Products Association will also serve as a contact committee for the new Regional Laboratories. It is not for us to say how much contact you would want but our plan would be for the Industry to serve you through such a committee.

Mr. Barrow: Yes, I omitted saying that.

Dr. Henry G. Knight: I have been very much interested in what you have to say. I believe you should feel that the funds allocated for the Fellowship work in the Bureau have had a very significant influence in addition to simply supporting a particular line of research. It is a fact, I believe, that the idea of cooperative research expressed in the functions of the Research Fellowship has been a contributing factor to the concept of the larger program founded in the Regional Laboratories. I believe you can understand how the continued endeavor of the Basic Research Committee has promoted interest in the direction of regional research. While you have had your problems in maintaining this Fellowship, it has nevertheless helped to keep in the minds of the cottonseed people the fact that research offers a way out of some of their difficulties.

The other point I want to mention is that we had hoped that this Basic Research Committee, or the Technical Advisory Committee if so named, will be available to the Regional Laboratories for consultation and advice upon problems with which your Industry and the Bureau are mutually concerned. In fact, under the law the Department is authorized to consult with any individual organization or group that may be willing to provide unprejudiced advice and guidance for operation of the Regional Laboratories. We are planning our organization, therefore, so that immediate and effective cooperation can be obtained from groups, such as yours, that are already organized to represent an industry. By this means

we hope to secure the benefit of counsel from those who have gained through experience an intimate knowledge and vital interest in the fields of work to which these Laboratories will be devoted. We in the Bureau have become concerned about special problems in the cottonseed industry through the functioning of the Basic Research Committee and the Fellowship, and we have felt that this is one industrial contact that has been very important to the Bureau. We have pointed out that we have had research fellows in the past who have worked with the Industry on the one hand and with the Department on the other. I think you will find, if you go back over the Congressional Hearings, that this Bureau has contacted industry to a greater extent than any other Bureau in the Department because our work has been in large measure concerned with the utilization of agricultural products.

I hope that your Committee will be able to continue with the Research Fellowship. In fact, I was hoping that it would be possible to increase the funds for this work. Even when the Regional Laboratories are in operation there will be undoubtedly some particular phases of basic research which the Industry will want carried on and which we may not be able to include in our scheduled program. Continuing your Research Fellowship program would seem to retain the advantage for you to move promptly on problems that are of particular or urgent importance. Also, this continued contact with the Industry would obviously be useful to us in integrating the work at the Regional Laboratories and elsewhere.

I have missed Mr. Gregory at this meeting.

Mr. Barrow: Mr. Gregory is in the city today attending a meeting on fats. He will attend this meeting later if he can.

Dr. W. W. Skinner: I suggest that we organize our discussions under three heads. We should like to hear some discussion of the work that has been done under the Fellowship Agreement during the past year and the reaction of the members of your committee. Second, and I think it would be advisable to keep this as a separate point, consideration of the possibility of continuing the Fellowship from your standpoint. And third, the relationship of the future work of the Fellowship to the proposed work of the Regional Laboratories and to the research work here in Washington. That will give you a little better picture of the immediate developments among the Regional Laboratories. Is that program agreeable?

Mr. Barrow: It is agreeable.

Dr. Skinner: Let us consider what has been accomplished this last year.

Mr. Barrow: We had quite a good deal of discussion yesterday with Mr. Swift and Mr. Riemenschneider relative to their work. Any statement that Mr. Mitchell or other members of the Committee would care to make

this morning would be welcome. I would like to say that the Committee unanimously agrees that the Fellowship work should proceed along the lines of basic or fundamental research which Mr. Riemenschneider has been conducting. Mr. Riemenschneider very naturally felt that possibly at this stage it might be advisable to concentrate on some phase that would be interpreted in some quarters as being more practical than the results obtained during the past year have been. However, the Committee was unanimous in its opinion that the work should be continued along fundamental research lines.

Dr. Skinner: We are thinking of two very definite lines of investigation. That is necessary in developing the program for the Regional Laboratories. We are thinking of this basic research work as it affects (a) food and (b) non-food uses. By non-food uses we mean non-edible industrial products. We are not yet clear as to exactly what direction the developments may take in the work of the Regional Laboratories. It is of course impossible to anticipate the results or potential applications of the research work now being planned. We should keep this point in mind, although it does not signify any unnecessary indefiniteness in our future program. We are in a period of evolution and we are now dealing with the complex problem of coordination and integration of activities in our organization, other Bureaus of the Department, and other researches.

The work done under the Fellowship during the past year is, as you have recognized, fundamental in character. We are gratified in your finding that it is satisfactory. Concerning the placement of the Fellowship in the future--that should be determined by trends of the research. Fundamental research, and particularly that relating to food products, we believe should be continued here in Washington. If the work should develop in the direction of industrial applications, there may be definite advantages in transferring the Fellowship to a Regional Laboratory.

Dr. Knight: I think that Mr. Barrow understands that for the present the work will be carried on here unless it seems more desirable for the Bureau to transfer it to the Southern Regional Laboratory. However, we probably would not want to transfer it to the Southern Regional Laboratory until after the next year.

Mr. Barrow: I understand. But we are not acquainted with the policy of the Regional Laboratories in regard to these fellowships, as to whether it will be possible to establish and maintain fellowships at the Regional Laboratories.

Dr. Knight: I do not anticipate any material change in the general policy of the Bureau in regard to fellowships, and of course the Regional Laboratories are integral parts of the Bureau. If the Fellowship program can be conducted more efficiently in the Regional Laboratory, I do not now see any hindrance to the transfer.

Mr. Barrow: Is it the present intention that the Bureau of Agricultural Chemistry and Engineering shall continue to function as it always has, namely, as a fundamental research organization unaffected by the establishment of the Regional Laboratories?

Dr. Skinner: The Regional Laboratories really comprise an expression of the need to find direct applications for the results of fundamental research that have been accumulating both within and outside the Department. It is hoped that in the Laboratories we shall be able to develop in an industrial way some of the findings that could not previously be carried on to the pilot stage of actual industrial application.

Mr. Barrow: That is entirely clear.

Dr. Knight: These Regional Laboratories have brought an impact upon this Bureau and upon certain other Bureaus in the Department, but there is no intention of changing the policy of the Bureau except insofar as the Congress may require. I may state that, even though the activities of the Regional Laboratories will be directed primarily toward utilization, as time goes on considerable fundamental research related to development of industrial applications will be carried on in the Regional Laboratories. If you read the Act establishing the Regional Laboratories, you will see that the Congress was thinking in terms of utilizing results of fundamental research already done and demonstrating applications of these results on a large scale that would be useful and attractive to industry. I might call this the first level. The second level is concerned with correlating basic and applied research and I may illustrate by our work on sweet potato starch. The process for recovering starch from sweet potatoes was developed first in the laboratory on a test-tube scale. When we attempted to transfer our laboratory process to plant scale operations we found there was a lot we did not know. The process finally developed through several years of research on storage and factory production problems is far different from the process originally developed in the Bureau laboratories. Problems such as these are as a rule encountered in bringing a laboratory operation up to the pilot plant scale and finally to factory scale production. A third level of investigation might be considered in the exploratory type of fundamental research that seeks new compounds and new reactions. That may lead to creating new outlets or new methods for utilizing products now available in too great abundance for established demands. That is in general the course of progress in industrial research.

Fundamental research in various fields of agricultural science have been supported by Congressional appropriations during the past 75 years. Results have been directed primarily toward solving problems related to production and distribution. The new trend does not minimize the importance of past accomplishments but does bring emphasis upon problems of utilization. That is, primarily, the scope of the Regional Laboratories. They will supplement rather than supplant the established scientific functions of the Department.

Mr. T. C. Law: There has been quite some misunderstanding as to the work of the new Laboratories and their relation to the fundamental research and so-called industrial research. Apparently the general idea among those in our industry was that these Regional Laboratories would take care of everything. We know now that that cannot be done, but that attitude had considerable bearing on the decision made by our industry with regard to the Fellowship.

Dr. Skinner: That attitude has been unfortunate.

Mr. Law: They did not understand the difference between fundamental research and pilot plant research.

Mr. Barrow: There is one point I want to be clear about. Am I to understand that for the time being at least all fundamental research pertaining to food uses of our products will fall in this Bureau?

Dr. Skinner: No, there is no inflexible rule about that. Some developments now in prospect may lead to undertaking some phases of food utilization in the Southern Regional Laboratory.

Dr. Knight: From a legal standpoint the Act is sufficiently broad to include food research in the Regional Laboratories. That was brought out last year in the Congress. We were advised that the Act itself was broad enough to cover food research. But it was very clear that the Congressmen and Senators who were most active in providing for establishment of the Regional Laboratories were thinking primarily in terms of industrial utilization. In the Appropriation Bill last year the Act was amended to include food research. This modification was made to assure freedom of action in regions where surplus fruits and vegetables may be important problems. This year there were no further discussions on food research in Congress. Probably there will be food research in the Western Laboratory because some of the serious crop utilization problems in the West have to do with materials such as fruits and vegetables that have little to offer for development of non-food uses.

Dr. Skinner: Looking over the results of the work of the last year, it occurred to me that your Committee might care to indicate a preference for some one line project or work project such as we take care of under an appropriation unit. The actual work which we do, we call a line project or an operating project. A program was submitted to you last year in which there were a number of research line projects. Last year I was not very closely identified with the work because of illness, but it appears that you left it to us to decide which of these line projects should be taken up. At this time I want to know if the Committee has any preference in the order of development of any of these projects.

Dr. Richardson: I believe you should conclude that the Committee by not designating any preference for one line project over another intends to leave the choice to you. At the risk of emphasizing a personal

preference or seeming to interpret the attitude of the Committee, I have noticed that there seems to be more enthusiasm for an immediate project relating to the composition of cottonseed oil than there is for one concerned with the keeping quality of oil, notwithstanding the fact that an investigation of keeping quality is the ultimate object in view. I want to be contradicted by the other members of the Committee if I have made an overstatement. Also, I would like to point out that we may reach the stage where we may prefer to terminate this line of work some day. Discussion in our meeting yesterday brought out the view that there are other lines of work which are no less important than rancidity or keeping quality. I do not mean to interfere in any positive way with the present situation and wish to leave the plan of work in your hands. I do believe that you will probably give us more valuable information for the time being by continuing your line projects on the composition of the oil and by keeping rancidity as much in the background as your judgment may direct.

Mr. Law: It is the opinion of the Committee that it is going to be necessary to learn a great deal more about composition before we can really go ahead on the stability studies. I think the problems are so closely related that it would be very difficult to separate them. If you work on this problem of composition, I assume that you would carry it through by measuring the stability of the isolated components. Just making a study of composition alone I do not think was contemplated in the original project.

Dr. Skinner: If you leave the direction of this work which you are supporting to us, we agree as part of our program that we will develop it along those lines which seem to fit best into the Bureau program. But it would be a little more satisfactory to us to know that our procedure is entirely approved by you people. When, for example, a study of the identity of alpha and beta linoleic acid was made, we thought it was quite a fundamental point to determine how many linoleic acids we were dealing with. Mr. Riemenschneider's work in the past year has been made along several research line projects enumerated in the outline of the plan which you have before you. This work is of value not only to the things in which we are interested but also to the work which is being supported by your Fellowship. At the same time if you have any preference as to these line projects (there are about 20 of them), we should like to know so that we can make any alterations that would better suit your ideas.

Mr. Law: Do you think it would be well to review these line projects?

Dr. Skinner: Just as you please.

Mr. Law: Personally, I am rather unfamiliar with them.

Dr. Skinner: You will remember that last year in the discussions and those of the year before, there was a change in the type of the work of the Fellowship. Prior to that time Dr. Stevens had been working along a somewhat different line, and that work, by the way, has developed into a larger project here in the Bureau. The present

\$30,000 which we are spending on the allergen research really originated in some of the work done under your Fellowship, and I think that is a very splendid development and one that ought to be known among your people.

Mr. Barrow: I know of this development, Dr. Skinner, and we are gratified that Dr. Stevens has continued the work in this Bureau.

Dr. Skinner: I hope some of you will take the time to look into the allergen work while you are here. There was submitted to you when the change in program was found necessary two years ago, and again last year, a plan outlining a series of line projects. Do you have the skeleton outline?

(Copies of outline distributed and read by Dr. Skinner)

We could emphasize in the work of the coming year, if you have any preference, any one of these line projects. If you have no preference, we would select those projects which best fit in with our general program of research.

Mr. H. S. Mitchell: Do I understand that under the first item you would take that as a line project and complete it without consideration of the other two or three items of the first group?

Dr. Skinner: They are pretty closely related. Probably a-1, a-2, and a-3 should be taken together. We would set up a time limit for the completion of the work, probably 6 months, 9 months, a year, or possibly 2 years. So much of the time would be devoted to the preparation of linoleic acid which must be done, say by September 1, or whatever date had been set. Then we would take up the second project. Thus we could get some evaluation of the work done.

Mr. D. F. J. Lynch: That outline would be an outline of your Committee covering the whole oil research field. The program set forth would cover a complete division of, say, 30 to 40 men and would cover a period of 5 to 10 years.

Mr. Mitchell: I am not just clear on this. My idea obtained yesterday in discussing the work of the Fellowship was that you would not only work on Project No. 1, but would follow it through to the separation of the minor constituents. I believe it would be very important to follow through the isolations to their conclusion with a study of their stability. This is the thought I had in connection with the Fellowship work.

Dr. Skinner: This program which is submitted to you is one that Mr. Lynch has set up as a large program of considerable duration in the Southern Regional Laboratory. Some of this work will be carried on by the Bureau in Washington. Even if we had a dozen men on this project, we should have to carry on some of the work in the Regional Laboratories.

Dr. Henry Stevens: The discussion seems to indicate that the program is fixed at this time for a whole year. That is not the case, because

at intervals reports are made to the Basic Research Committee and the trend of the work can be altered at any time on the basis of those reports. Suppose that Mr. Riemenschneider and Mr. Swift find that it is desirable in their judgment to depart from the original program of composition **study** by turning attention to the minor constituents. There is sufficient flexibility in the program to allow such revisions, and they may be put into effect six months or nine months from now. Only agreement between the Committee and the Bureau would seem to be necessary to change the course of the work at any time during the year.

Mr. Mitchell: The point I have in mind is that when the program was first made work was to be directed along stipulated lines. By all means, in the preparation of the pure compounds or in the separation of the various constituents there should be close contact between the two groups of problems or line projects even though that may be the wrong way to designate the work.

Dr. Richardson: I do think it is a fact that the major part of the energy that the men have spent on the line projects has centered on matters of composition of the constituents as such, and that a smaller proportion of their energy to date must have gone to the study of rancidity. I believe under the circumstances that this is wise, and I predict that it will be true at least in the near future. I believe it is the most efficient thing to do.

There is another reason that has not been mentioned why this Committee, within the limits and without any pressure from its source, the Cottonseed Association, must in the interest of efficiency leave to you the choice of line projects. If we could get all the answers implied in this research program, they would be of more interest to the people than we anticipate. Therefore, since all the line projects are of interest, other things being anywhere near equal, the best attack is on the problem which is going to yield the most information for the effort. That is not likely to change in the course of a single year. I think, therefore, it is to our selfish interest, as well as to your selfish interest, to leave you a free hand. Perhaps you would like to throw a line project aside and tackle another line project when you get a better idea from work you are doing. We ask you to permit yourself the privilege of substituting one research line project for another if it fits better with your own program of research.

Dr. Skinner: I was just asking for a preference because this project is a little different now from what it will be in the future. Your research work now is more in the field of the activities here in Washington. We have oil work going on in six places. For instance, we have an oil section in the Soybean Laboratory and oil work in the Tung Nut Laboratory. There is quite a bit of oil work going on and I believed it would be to your advantage to designate where the emphasis should be placed. This opportunity is available to you. If you are doing a piece of work here, it may be of value in certain other lines that we are following, but we will not duplicate it. However, if there is any preference, we can shift the emphasis of your work. Am I making it clear?

Dr. Richardson: I believe it is wise for you to exercise more freedom without much influence from us.

Dr. Skinner: That leaves more responsibility to us.

Dr. Richardson: In deciding what preference we would like to express to the Bureau, we seem to have preferred the policy of not expressing a preference. Perhaps we have overlooked something.

Mr. Law: We agree with you on the study of composition. Mr. Mitchell's idea is that when that is done attention should be given to each one of the other line projects. I believe that would be the general expression of the Committee.

Mr. Barrow: I believe Dr. Richardson may go further than that judging from the emphasis which he placed yesterday on the study of projects in the first section.

Dr. Richardson: We did not take a position as a Committee.

Mr. R. W. Riemenschneider: At the conference yesterday we could see that the general project could be entitled an isolation and study of the chemical and physical properties of the constituents of cottonseed oil. We could see for the immediate future that the line project should be the study of the fractions obtained by molecular distillation of cottonseed oil which could well include a limited study of the stability of the fractions.

Dr. Knight: I want to make one statement. I feel that the Committee would like to have a statement of the significance of the research carried out under the Fellowship during the past year and the relation of this research to the research of other groups. If you would like to have such a statement, it could be prepared. It may help you to place the results of the work before the Association.

Mr. Barrow: I think it would be very helpful.

Dr. Skinner: Was the report of the work handed to the Committee?

Mr. Barrow: Yes, I have a copy. I think it is very well to include a statement of the significance of the work.

Dr. Skinner: Can we dispose of the first phase of this discussion? Are there any other comments on this matter of the line projects which have been submitted? Do you have anything to say, Mr. Riemenschneider?

Mr. Riemenschneider: No, I have not.

Dr. Skinner: If there are no further comments, we shall assume that we will continue as we have done before, permitting the Bureau to select those line projects which are submitted to you and which best fit into the work of the Bureau. The next question is the support of the Fellowship. Do you care to say anything further about that?

Mr. Barrow: This Committee cannot speak authoritatively. We have to apologize for the action taken last year which has been very embarrassing to the Committee and to many members personally. We cannot say what possible action will be taken by the Board but I know that after the action taken last year there has been quite a feeling of embarrassment on the part of some members of the Industry. I feel reasonably certain when I say this, that we believe that the Association will accept the recommendations of this Committee. Now as to a larger program or increasing the funds of the program I cannot state. I am not in a position to say whether there would be a disposition on the part of the Association to go along on this program, but I was assured by Mr. Gregory that such a thing as occurred last year will never happen again. Mr. Gregory has been in close contact and interested in the Bureau and I feel that he was rather embarrassed by the action of the Association. With that very qualified statement, I feel that the work can go on.

Mr. Law: I will say that you can depend on us.

Mr. Barrow: It is our desire to continue the work until we can determine the status of the Regional Laboratories.

Mr. Law: This Committee will recommend that it continue.

Dr. Knight: The work should be continued at least until July 1, 1941.

Mr. Law: I think you can rest assured on that.

Dr. Knight: We will have another meeting next year and we can discuss it again at that time.

Dr. Richardson: It is an unfortunate circumstance that the budget year of the National Cottonseed Association begins July 1. The members responsible for that budget year are elected by the Board of Directors to the Appropriation Committee shortly before that date. Therefore, their action comes embarrassingly late. After last year's experience some members of this Committee as individuals will be warned in advance and will take such individual action as they will find suitable, and that will save a lot of time and effort such as Mr. Schwartz spent in getting things straightened out last year. Summarizing it, Mr. Barrow, forewarned should be forearmed.

Mr. Barrow: After the meeting yesterday, I told Mr. Gregory of the action of the Committee and explained to him that the recommendation of this Committee would be submitted immediately to the Board and to the Budget Committee because the agreement with the Bureau expires July 1. He said that further information could be had by correspondence so I do not think we will have to wait until a new Board of Directors is elected or a new Budget Committee is appointed.

Dr. Skinner: Certain of the factors pointed out in taking up these line projects are quite important considerations or important factors in connection with future activities on these projects.

Dr. Richardson: It is quite definite that this Committee would ask the Bureau in planning their line projects to proceed on the assumption that the work will be continued at least through the next year.

Dr. Skinner: Just as in your case we cannot by law obligate ourselves to a program of work until the appropriation is approved.

Mr. Riemenschneider: One thing could be pointed out--the work project in itself offers a great deal of latitude. It is quite possible to break it down to further specific investigation if anyone cares to do that and still permit us to have some latitude within the limit of the specific line project.

Dr. Skinner: With regard to the question of the program of the Southern Laboratory, I think it might be well for Mr. Lynch to outline the tentative program which has been developed.

Mr. Lynch: (Copies of program distributed). We wrote this up in sort of a popular way as a summary which we thought you might like to take with you. It is not written up for release and not in our regular form. I think Dr. Markley is going to head our Oil Division in the Southern Laboratory, and he has the actual work projects which are covered in this condensed summary.

Dr. Skinner: That covers the broad field of the work of the Laboratory in this particular subject. I think that it may be well to restate here some of the difficulties we have already experienced in organizing this program. Because of a lack of understanding of what is back of the movement to create these laboratories some have come to look upon them as a sort of catch-all into which everything in the way of research could be put. That might be all right if the amount of money justified it, but even in that case it might be undesirable because we have a very definite and specific objective in the legislation. If the Laboratories are called upon to add too many and too diversified activities, although scientifically interesting, we shall be swamped and in grave danger of losing the effect of our efforts in the attempt to expand the use of farm products in industry. Some feel that we may be forced into making scientific excursions, into genetics, for example, which may be highly desirable in themselves. But such excursions are not within the zones of our program and would in my opinion defeat the primary object of these Laboratories. We may need the help of the gentlemen around this table, and others as well, to keep the needle of our compass pointed right at our fixed star of purpose as far as the Laboratories are concerned. Otherwise, at the end of the ten years, we may find ourselves with a lot of material which was not contemplated in the original purpose of the legislation. So we have our difficulties.

Dr. K. S. Markley: I might state that the projects summarized here have already been reduced to work projects and they in turn will be reduced further to specific research line projects. In doing so, I have tried to avoid duplication of effort not only in our own Bureau

but outside the Department. I had a talk with Mr. Cook of the National Cotton Council regarding their projects at Mellon Institute and have visited the University of Tennessee and the Texas A. & M. regarding the projects at these institutions, and as far as I can learn what they are doing in these places, and they have been rather frank in stating what they have been doing, we shall avoid duplicating their work. In Tennessee they have been working on cottonseed plastics and we do not intend to duplicate their work. We can avoid duplication only to the extent of our knowledge concerning what others are doing. If they do not disclose to us what they are doing, it will not be possible to avoid duplicating some possible research activity.

There are only certain words in the dictionary by means of which ideas can be expressed. Therefore, for lack of words it may appear from this program that what we propose to do is exactly what others may be doing in the same field. This is not true, however, as can be illustrated by reference to Mr. Riemenschneider's program and that of the Southern Regional Laboratory. Both include projects on minor constituents of cottonseed oil, but in their program there is no mention made of phosphatides. An important industry is based on the isolation and utilization of phosphatides from the soybean. Just recently I went through a very large plant in Chicago (there are three or four plants in Chicago producing phosphatides), and although there are more phosphatides available than the market can absorb at present, they nevertheless thought they ought to know how cottonseed phosphatides differed or behaved in comparison with soybean phosphatides. The sterols form another potential material from cottonseed oil which goes to waste at the present time. However, in view of the recent work on the conversion of stigmaterol, sitosterol, and other sterols to progesterone, testosterone and other sex hormones, it is important to know what sterols are present in cottonseed oil, in what amounts, and how they may be economically recovered. These potential products have for the most part either been going down the sewer or into roofing paint. No one has investigated the possibility of removing them and prior to the recent developments in sex hormone chemistry there was no use for them.

Dr. Skinner: Dr. Markley's statement is very interesting. You see there is a large field here and I hope that you gentlemen who are interested in this Fellowship will realize that with the opening up of this picture from time to time we shall need your counsel. We are hoping that some of the pioneer work will be of direct interest to some of the people of your Industry.

Dr. Markley: I also might say that in connection with the processing project there will be other processing investigations carried out by the Engineering and Development Division on the seed prior to point where our processing work starts. In the Oil Division we are only interested in pressing and extracting the oil after delinting. The Engineering & Development Division will work on methods of drying and storing seed prior to pressing or extraction. However, the quality of the oil and meal derived from stored seed and by different methods of processing will be one of the objects

of the Oil Division. The investigations on the actual drying and storage of seed will not, however, be in this Division. This is an example of what we mean by cooperation with other divisions of the Laboratory. Of course, there will also have to be analytical work done in connection with the investigations of storage effect on seed quality which will be carried out in the Analytical Division. Then there are other problems, dehydration before storing and rehydration before pressing. Some efforts have been made to solve the latter problem but not very successfully.

Mr. Andrew Schwartz: Will not some work be carried on by the Department even though it is carried on by other agencies where it is more or less side-tracked? I have in mind the cottonseed studies at the University of Tennessee.

Dr. Markley: I went down to Tennessee and spent two days there investigating their research on pressure cooking of cottonseed. There are also at least three or four commercial concerns working very actively on the pressure cooking problem and at least two pilot plants are in operation--one on cottonseed and one on linseed. One commercial mill I understand is in operation. I cannot, therefore, see that we would be justified in studying this particular phase of oil processing. We might include a pressure cooker in our pilot plant processing line more for comparison with some other form of processing, for example, with expellers or solvent extraction.

Dr. Skinner: It does not mean that we shall not be interested in it but we will be interested in articulating our work with other work being done. An invitation would be extended to those who are able to do the work better and we will notify them that it can be done at their plant.

Mr. Law: If we have a pressure cooker there, we shall have four installations to make a study of the work.

Mr. Lynch: I think Mr. Barrow will be interested in the separation of our divisions as they pertain to cottonseed, and of course to linters. We have two Cotton Divisions which will not affect this industry, that is the Cotton Processing Division under Mr. Cheatham where we will study the processing of the lint. We will also have a Division under Dr. Scott for cotton chemical finishing. We will have a Division on the fundamental study of cotton fiber as it relates to its use, and they will be the people who will study linters and fiber. Also one of our large divisions will necessarily be the Physical and Analytical Division. They will have a lot of control work not only on cottonseed as it occurs in the industry but also on the individual components of cottonseed. A large group will work on the control and storage of cottonseed. This analytical work will tell us what happens to the seeds in storage. These investigators will have to develop new methods to accurately determine what changes occur in the seed. Of course, we will have a good-sized Chemical Engineering Division. We will have engineers there to carry to a pilot plant scale the results of laboratory research. Our best re-

search men do not have experience in engineering and do not like engineering. They like to carry their work up to the engineering or pilot plant stage and then stop. Other investigators will cooperate with the Engineering Division.

Dr. Skinner: The founding of the Regional Laboratories has made it necessary to rearrange some functions of the Department of Agriculture both outside the Bureau of Chemistry & Engineering as well as inside. Mr. Cheatham of the Division of Cotton Marketing, Bureau of Agricultural Economics, who had the development of new uses for cotton, now goes to the Southern Laboratory. We are taking over the entire section on cotton uses from the Bureau of Agricultural Economics and placing it in the Southern Laboratory.

Mr. Barrow: I am very much interested in what Dr. Markley had to say about the study of crude cottonseed oil and the study of phosphatides. There has been quite an emphasis on oil quality in relation to phosphatides in the past few years. In more recent years, particularly with the development of pressure cooking and modifications of the hydraulic pressing system, it has been found that by control of temperature, pressure, and other factors during certain stages of the process, it is entirely possible to materially affect or improve the quality of crude oil produced from the same grade of seed. I think Dr. Markley will bear me out in the statement that while we have noticed this phenomenon there has never been any actual chemical work relating the chemical changes produced by differences in processing and of the effect of phosphatides on the refining of the oil. I might mention a mill in our territory which is regularly producing crude cottonseed oil with a refining loss below 2 percent. They have actually had cars running as low as 1.7 percent, and if you are the least bit skeptical of this statement, I can have the mill ship you some of it. This low loss has been brought about by a more careful regulation of the cooking pressure and temperature. Along these same lines, we have been in another blind alley. That is, in washing crude cottonseed oil to remove some of the phosphatides. Undoubtedly, the quality of crude oil can be improved by washing but you produce a residue of sludge equal to a refining loss of $2\frac{1}{2}$ to 3 percent, which just about offsets the reduction in refining loss of the washed oil. Unless some utilization of this sludge can be found there is no advantage in removing it. A sample of cottonseed phosphatides was sent to the American Lecithin Company in Chicago who reported them to be different from those of soybean oil. They said, however, they had ample supplies of soybean phosphatides at present.

Dr. Richardson: Where would future problems relating to the fertilization value of cottonseed meal be placed in the Department of Agriculture? Would it fit into the work of the Southern Regional Laboratory? It would seem advisable to very carefully investigate cottonseed meal not only with respect to its nitrogen constituents and its smaller amount of phosphorus but also with respect to growth stimulation factors. It is conceivable that cottonseed meal may contain something that would speed up germination and growth. Where would a

problem, looking broadly at the fertilization values of cottonseed, be most logically placed?

Dr. Knight: You have asked a question which has come up for the first time to me. We do have a Division of Soil Fertility in the Bureau of Plant Industry. Should we go into that field pot tests could be done in the laboratory. I do not think I am in a position to answer with regard to the supervision of such activities in the Southern Regional Laboratory.

Dr. Skinner: These Laboratories are going to affect more than just the work in this Bureau. If the work of a Laboratory indicates that some phase of activity fits better into some other research project or some other Bureau, it will be directed toward that end. Your suggestion is, therefore, a very important one.

Dr. Knight: We have a lot of problems in coordination of our work that have already come up in making up our tentative program of research. Some of them we have answered in our own minds but the further we go the more we become involved in the coordination of activities and in development of the most effective relationship between the work of the Regional Laboratories and that of our own and other Bureaus.

Dr. Skinner: It is a well known fact that some organic fertilizers have a specific growth-stimulating effect on plants. That is of tremendous interest. We know from practical agriculture tests that under certain conditions cottonseed meal gives better results than any other fertilizer of similar composition.

Dr. Richardson: Have you noticed varying results from individual users of cottonseed as fertilizers?

Dr. Skinner: Soil conditions tremendously affect the results of fertilizer tests. For example, vitamin B₁ on certain soils show tremendous stimulating effects while on others it has little effect or none at all. It may be that some soil does not need it. We get vitamin A with our natural food. A small added portion of vitamin A will not show much effect, but if there is a deficiency of vitamin A, a small additional supplement will have very significant effects.

Dr. Knight: A few years ago we thought of fertilizers only in terms of phosphates etc., but now we know that indoyl acetic acid and related indoyl compounds are important growth-promoting factors and are now known to be present in cow and other manures. Undoubtedly, if you break down cottonseed products, you get similar compounds. If you add vitamin B₁ to cottonseed and apply it to your garden, you will not get the same stimulation as when you add vitamin B₁ to ordinary mineral fertilizer and apply it in the same way.

Dr. Markley: Will not the work on the minor components of cottonseed meal and cottonseed oil actually stimulate applied studies by other organizations? For example, suppose it was demonstrated that cottonseed meal contained vitamin B₁ or other growth-promoting factors,

would not such an announcement stimulate the experiment stations immediately to start working on the fertilizer value of cottonseed from that standpoint?

Dr. Skinner: The work of these Laboratories should stimulate all types of related researches.

Dr. Markley: You cannot predict the future use of any discovery made in the laboratory, especially as a result of the discovery of chemical factors which no one suspected to be present. As soon as these factors are known to be present in a product, this new knowledge will in itself stimulate other research.

Dr. Richardson: That is all very true, but is it not very urgent that systematic experiments be made looking for products analogous to those already known to stimulate plant growth at any stage, and also in storage, and under whatever particular conditions will apply in this country? I should like to recommend for serious consideration, in such a program as Dr. Markley mentions under Item V, investigations on the use of cottonseed meal with respect to specific effects on plant growth rather than as fertilizer in the conventional sense of the word.

Mr. Schwartz: The question I'd like to ask is, is it very likely that the solution of research problems would lead to machine design? Is it within the scope of the Laboratories to undertake such design problems?

Dr. Knight: It is within the scope of the Laboratories to undertake such problems. We have a very broad mandate from the Congress to carry our research to the pilot plant stage which necessarily involves equipment design problems.

Mr. Barrow: Mr. Fash, you have been very quiet this morning. Isn't there some question you would like to ask?

Mr. Fash: The point I would like to emphasize is the necessity of developing the fundamental facts. Unless you have such knowledge you can only go into plant research work and try to develop products and processes by rule-of-thumb methods, and what I believe is most lacking in the industry is a knowledge of these fundamental facts. The men who are not in contact with scientific work, except as it affects their pocketbook, feel that they can drop into a laboratory and get a check-up by using the results of research. I believe Kettering has expressed the view not to expect a research program to solve your immediate problems. Research should be conducted to develop facts that will be available in solving problems as they come about. I just cannot emphasize too much the necessity of doing this fundamental research, as we term it, and to try to get some kind of article or series of articles before our Association so that the leaders in it will realize that work that is done now may save them five years from now.

Dr. Markley: In the project listed there (I do not know the number of it) under chemical studies, there is a specific work project, the purpose of which is to obtain fundamental physico-chemical data such as temperature, vapor pressure relations and other thermal and thermodynamic data which is very essential to the proper design of equipment either for pilot plant or commercial operation. For example, most fatty acid stills which are now in use, with possibly one exception, are not designed on the basis of any real knowledge of the vapor pressure-temperature relationships of the acids being distilled. Equipment manufacturers have used such data as is available for hydrocarbons and related substances and apply them in designing equipment for the vegetable oil industry. One project is devoted entirely to getting these physical-chemical constants, which it is hoped will be finally used in industry for the solution of equipment design and processing problems.

Mr. Schwartz: Will that work be extended to cottonseed oil in its various stages of manufacture?

Dr. Markley: Yes, that is what we have in mind, for example, in connection with studies on heats of crystallization. This type of data applies very definitely to the manufacture of oleomargarine and shortening. Both of these processes involve crystallization phenomena. We hope to study heat of crystallization, temperatures of crystallization, the behavior of complex mixtures of known composition and how they influence crystallization, which data should be of value in the shortening manufacture. Problems, for example, involving how much refrigeration is necessary per unit of shortening production, the refrigeration required for stearic acid production and related processes may be solved with such knowledge of heats of crystallization.

Mr. Barrow: That is true of many of our operations. There are operating conditions which affect the results we obtain and about which we know very little. We know that under certain controlled conditions we can obtain certain results and we are still working to find out what the best conditions are. The type of research which you plan in this program will certainly answer many questions and suggest new possible types of equipment and control of processes.

I want to go back to Mr. Lynch's remarks about studies on cottonseed. I want to register my thought that there is a very important study, and it is of particular importance in relation to plant operation, which results from the general idea of accepting cottonseed on an oil content basis. Some studies have been made on varieties and cultural conditions with the thought in mind of developing varieties of a maximum lint and oil mill value which should be of great value in producing cottonseed. I presume that your program also contemplates such a study.

Mr. Lynch: We have already made plans along these lines and established some contacts. Mr. Dawson, who was formerly with this Bureau in charge of the cotton root work in Texas, is now back with our Bureau and will have charge of the composition-variety studies. This is a

cooperative type of problem involving the Bureau of Plant Industry and the Experiment Stations. There is the problem of the relation of lint fiber quality to variety, some studies of which are being made by the Bureau of Plant Industry and the Bureau of Agricultural Economics. However, there hasn't been a great deal of work done on the relation of the oil to the variety of cottonseed. We have these things in mind and realize that we have a big job ahead, but we expect some concrete cooperation from the Bureau of Plant Industry and the State Experiment Stations which are not just word promises. They have already told us what they can and will do in the way of cooperation and we will accept such cooperation as we can get. These varietal studies mean an awful lot of work. Dr. Skau is going to help out quite a lot on these activities. Mr. MacNamara of the Mississippi Station has some very fine ideas on this subject and we went over some of the material he has available. He wants some answers to some very definite problems. It is not just some indefinite idea that we will cooperate with them. They actually know what they want us to do and what they can contribute.

Dr. Skinner: One of the things these investigators hope to do in these Laboratories and are going to do is to stimulate research work and open for us fields that will give a new direction to the work in the Department.

Dr. Knight: Already it is beginning to stimulate certain industries to increase research appropriations and if that continues we may expect rapid advances in research throughout the country.

Dr. Skinner: There is something you gentlemen can do to help the cause in which we are interested, not merely among scientific men but Congressmen and the public. We have done much research in the past 25 years. Fundamental research may be looked upon as a process of filling a reservoir. These Laboratories will draw from this reservoir and utilize the facts stored up in the reservoir. If you accept that simile, you are forced to the conclusion that additional fundamental research work must be carried on or the reservoir will be dried up whereas it should be kept full. As you draw on the reservoir, fundamental research must be carried on in order to store up facts in the reservoir for future use.

Mr. Barrow: I wonder if Mr. Gregory wants to say a word. He has an important position in the Association and has always manifested a great interest in this research program and I am sure is interested in what has been said by you gentlemen here in Washington.

Mr. T. H. Gregory: I am glad to be here with you, although as I just remarked to Dr. Stevens, since I have been here I have heard only three or four words used which I understand they are seed, oil, and meal.

Dr. Skinner: We are glad to have you here with us, Mr. Gregory. One of the nice things from our standpoint about an association like this is the stimulation which comes from meeting with you gentlemen of the business world. It not only stimulates us to new endeavors but makes

the job we are trying to do a little more satisfactory. I hope everything goes well with you. We do get a tremendous stimulation out of the Fellowship work just as we do with the contacts with your Association.

Mr. Barrow: This has been a very happy stimulus to us and we appreciate the frankness you gentlemen have shown during our discussion.

Mr. Law: I'd like to inquire again how much money Dr. Stevens has been spending on his project.

Dr. Skinner: The Department is now spending about \$30,000 on the allergen work. The first work done in this field here was with the money contributed by your Association. The work that Dr. Stevens did while in the Fellowship stimulated the activity here in the Department to a point where the Secretary under the Bankhead-Jones Act found it advisable to allocate funds to establish the allergen work as a Department activity. This project was selected in competition with many other requests for research funds, yet the Secretary found it advisable to allocate the \$30,000 annually for the work. It has already gone far and we have great hopes that some very worthwhile results will come out of it. That type of work has in turn stimulated other closely allied lines of work. The allotments for the plant and animal virus work was also in part stimulated by the allergen activity. So it is very pleasing to say that the original funds placed here by the Association have developed and gone forward in a manner never anticipated when the Fellowship was established.

Mr. Gregory: I am glad to get that information for I am sure very few of our members really realize and understand what has been done and how much this program has grown. I am certainly going to pass it on to the membership.

Dr. Knight: I would estimate that approximately \$100,000 is now being spent by the Department in work which was stimulated by investigations beginning with the Fellowship.

Mr. Law: We have a few graduates here who started from our Fellowship work.

